



Physical Sciences Informatics (PSI)

NASA Research Announcement (NRA) Proposers' Conference

January 26, 2016



Meeting Agenda



Topic	Presenter
Physical Sciences Program Overview	Dr. Francis Chiaramonte, NASA HQ
NRA "Use of the NASA Physical Sciences Informatics System - Appendix B"	Harri Vanhala, NASA HQ
Q&A session	Open discussion
Requesting access	Cheryl Payne, NASA MSFC
PSI system demo	Cheryl Payne, NASA MSFC
Q&A session	Open discussion

FOR ATTENDEES:

- All attendee phones will be muted by the meeting host to minimize background noise.
- All attendee phones will be unmuted during the Q&A sessions.
- Please ask questions anytime during the presentation by using the Chat feature in WebEx. Questions will be addressed during Q&A.



Physical Sciences Overview

Francis Chiaramonte

Program Scientist for Physical Sciences

January 26, 2016



SLPS Gravity-Dependent Physical Sciences Research



Biophysics

- Biological macromolecules
- Biomaterials
- Biological physics
- Fluids for Biology

Combustion Science

- Spacecraft fire safety
- Droplets
- Gaseous – Premixed and Non-Premixed
- Solid Fuels
- Supercritical reacting fluids

Fluid Physics

- Adiabatic two-phase flow
- Boiling, Condensation
- Capillary Flow
- Interfacial phenomena
- Cryogenics

Materials Science

- Metals
- Semiconductors
- Polymers
- Glasses, Ceramics
- Granular Materials
- Composites
- Organics

Fundamental Physics

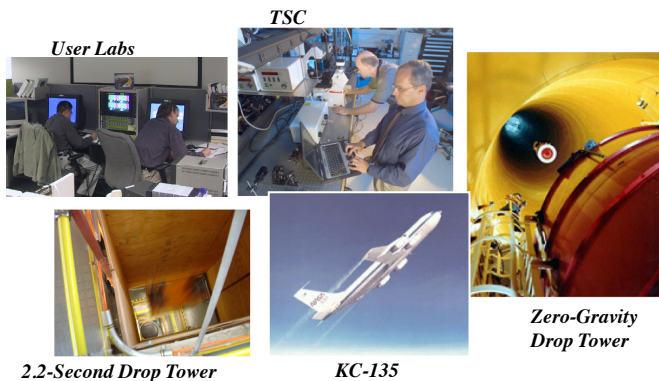
- Space Optical/Atomic Clocks
- Quantum test of Equivalence Principle
- Cold atom physics
- Critical point phenomena
- Dusty plasmas

Complex Fluids

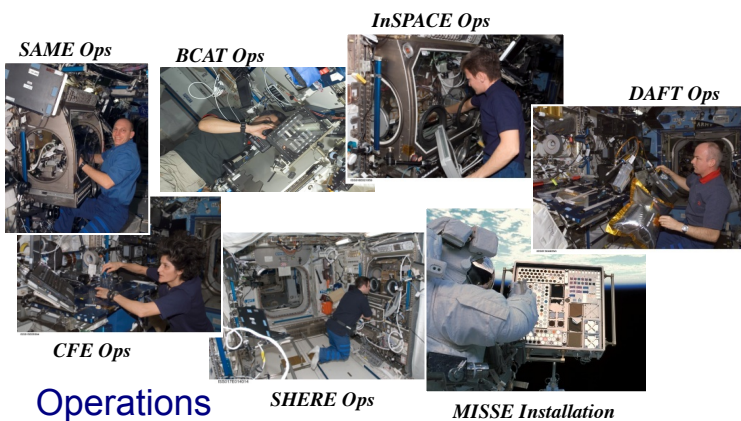
- Colloids
- Liquid crystals
- Foams
- Gels
- Granular flows



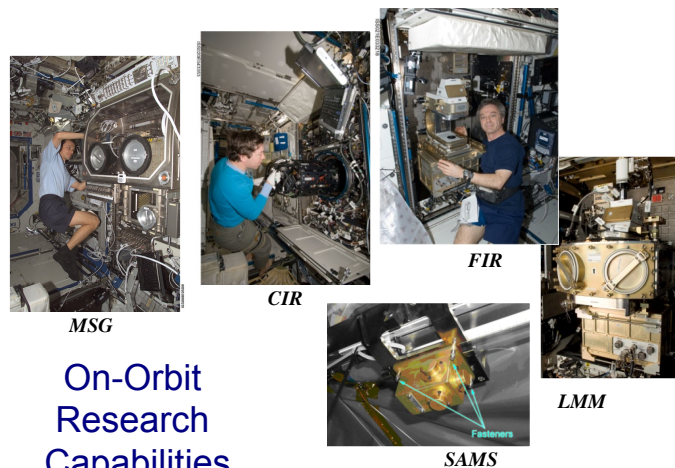
ISS Research at GRC



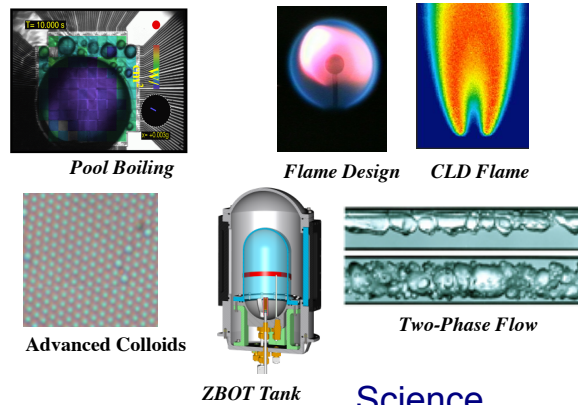
Ground-Based Research Facilities



Operations



On-Orbit Research Capabilities



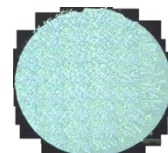
Science



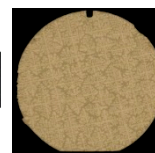
ISS Research at MSFC



Payload Operations Integration Center



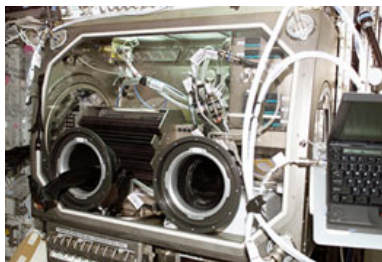
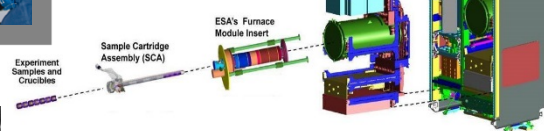
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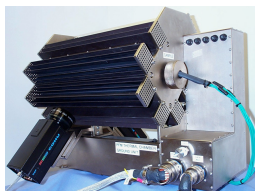
0-g

MICAST

Microgravity Materials Science Research Rack



Microgravity Science Glovebox



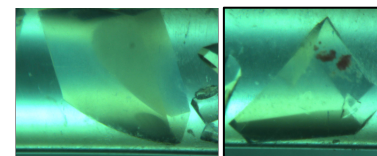
PFMI



ISSI



SUBSA



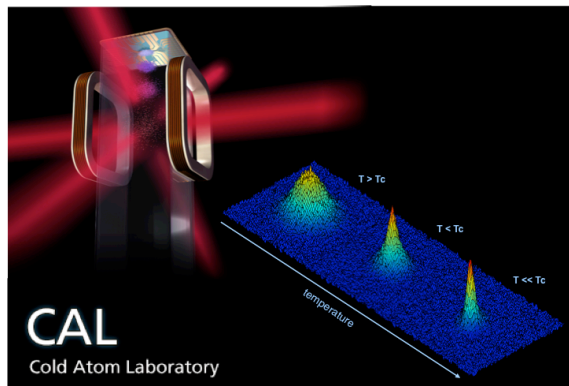
2m
m

Large volume, ISS grown, protein crystals

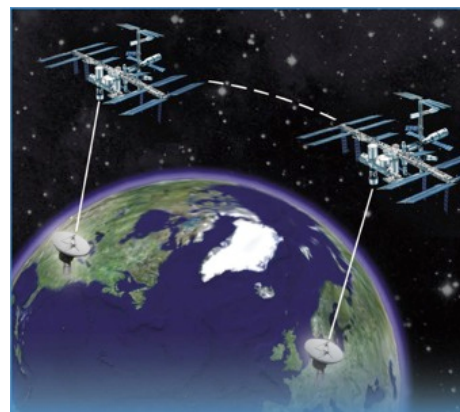
DECLIC – Transparent Alloy Solidification



ISS Research at JPL



Cold Atom Lab



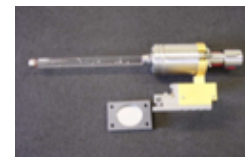
Atomic Clock Ensemble in Space



PK – 4 (dusty plasma)



DECLIC – Critical Point Phenomena





PSI - Physical Sciences Informatics System



At NASA, we are excited to announce the Physical Science Informatics (PSI) System, a data repository for physical science experiments performed on the International Space Station (ISS). The PSI system is accessible and open to the public thus fulfilling the President's Open Data Policy. The website is: <http://psi.nasa.gov>

“The resulting data from that envelope of experiments will then be used to create experimental informatics libraries that will support many more investigators and funded ISS-derived research. What that does is, it converts what would be normally a single [Principal Investigator] PI research opportunity into multiple PI research opportunities now and into the future”. Marshall Porterfield, Space Life and Physical Sciences Director.



PSI NRA Release Dates: History and Plan



PSI NRA Appendix A – Released on June 4, 2015

PSI NRA Appendix B – Released on Jan.19, 2016

PSI NRA Appendix C – Target release date: Sept.15, 2016

PSI NRA Appendix D – Target release date: Sept.15, 2018

PSI NRA Appendix E – Target release date: Sept.15, 2020

This repeats every two years.....



NASA Research Announcement (NRA)

Use of the NASA Physical Sciences Informatics System

Appendix B

Harri Vanhala, NASA HQ



PSI NRA Appendix B: Key Information



Key dates:

01/19/2016	NRA Appendix B Released
01/26/2016	Conduct Proposers' Conference
02/09/2016	Notices of Intent Due
03/17/2016	Proposals Due
05/27/2016	Target: Announce Selections

Award Information:

- Typical award: \$75,000 – \$100,000 /year, for a total maximum award of up to \$200,000 for a two-year period.
- Proposals of exceptionally high scientific and technical merit may be considered for up to \$125,000 /year, for a total maximum of up to \$250,000 for a two-year period.
- Expected number of selections: 10



National Aeronautics and Space Administration
NASA Headquarters
Space Life and Physical Sciences Research and Applications Division
300 E ST SW
Washington, D.C. 20546-0001

Use of the NASA Physical Sciences Informatics System

NASA Research Announcement

NNH15ZTT001N NRA

APPENDIX B

Soliciting Proposals for Use of the NASA Physical Sciences Informatics System for
Combustion Science, Complex Fluids, Fluid Physics, Fundamental Physics, and Materials
Science

APPENDIX NUMBER: NNH15ZTT001N – 15PSI_B

Appendix Issued: January 19, 2016
Notices of Intent Due: February 9, 2016 (5:00 pm Eastern)
Proposals Due: March 17, 2016 (5:00 pm Eastern)

Catalog of Federal Domestic Assistance (CFDA) Number: 43.003



PSI NRA Appendix B: Goal and Eligibility



Goal and Requirement: The Use of PSI Data:

- The NRA solicits ground-based research proposals – both experimental and numerical studies – utilizing experimental data residing in the PSI.
- Proposers **must review** the data in the PSI system before preparing their proposal. The proposal must clearly demonstrate how the PSI data will be used in the project.
- Prior to the submission of the proposal, it is highly recommended that the proposers take at least one representative sample set of PSI data to perform numerical modeling or sample experiments and present the findings as part of the proposal.

Eligibility:

- 1) Established researchers from all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit organizations, NASA Centers and other Government agencies
- 2) Graduate students (with advisors) from accredited U.S. postsecondary institutions and programs.
 - Note: proposals from graduate students must be submitted by their advisor.



PSI NRA Appendix B: Research Areas and Eligible Investigations



Research Area	Investigation
Combustion Science	DAFT (Dust and Aerosol Measurement Feasibility Test)
Combustion Science	DAFT-2 (Dust and Aerosol Measurement Feasibility Test-2)
Combustion Science	FLEX (Flame Extinguishment Experiment)
Combustion Science	SAME (Smoke Aerosol Measurement Experiment)
Combustion Science	SAME-R (Smoke Aerosol Measurement Experiment Reflight)
Combustion Science	SPICE (Smoke Point in Coflow Experiment)
Complex Fluids	ACE-M1 (Advanced Colloids Experiment-Microscopy – 1) *
Complex Fluids	BCAT-3 (Binary Colloidal Alloy Test – 3)
Complex Fluids	BCAT-4 (Binary Colloidal Alloy Test – 4)
Complex Fluids	BCAT-5 (Binary Colloidal Alloy Test – 5)
Complex Fluids	BCAT-6 (Binary Colloidal Alloy Test – 6)
Complex Fluids	InSPACE-3 (Investigating the Structure of Paramagnetic Aggregates from Colloidal Ellipsoids–3)
Complex Fluids	InSPACE-3+ (Investigating the Structure of Paramagnetic Aggregates from Colloidal Ellipsoids–3+)
Complex Fluids	PHaSE (Physics of Hard Spheres Experiment)
Complex Fluids	SHERE (Shear History Extensional Rheology Experiment)
Complex Fluids	SHERE II (Shear History Extensional Rheology Experiment II)
Complex Fluids	SHERE-R (Shear History Extensional Rheology Experiment Reflight)
Fluid Physics	CCF (Capillary Channel Flow)
Fluid Physics	CFE (Capillary Flow Experiment)
Fluid Physics	CVB (Constrained Vapor Bubble)
Fluid Physics	MABE (Microheater Array Heater Boiling Experiment)
Fluid Physics	NPBX (Nucleate Pool Boiling Experiment)
Fundamental Physics	GRADFLEX (Gradient Driven Fluctuation Experiment)
Materials Science	CSLM (Coarsening in Solid-Liquid Mixtures)
Materials Science	CSLM-2 (Coarsening in Solid-Liquid Mixtures – 2)
Materials Science	CSLM-2R (Coarsening in Solid-Liquid Mixtures – 2 Reflight)
Materials Science	CSLM-3 (Coarsening in Solid-Liquid Mixtures – 3)
Materials Science	ISSI (In-Space Soldering Investigation)
Materials Science	PFMI (Pore Formation and Mobility Investigation)



PSI NRA Appendix B: NOI and Proposal Submission



Notices of Intent (NOI)

- Submission of a brief NOI is highly recommended.
- Use NSPIRES (<http://nspires.nasaprs.com>) to submit your NOI.
- See Section IV.B.2 of Appendix B for details.
- **NOIs are due by 5:00 p.m. Eastern Time on February 9, 2016.**

Full Proposals

- The full proposal must include all required components listed in Table 2 of Appendix B (page 12).
- Maximum length of Scientific/Technical Project Description: 10 pages.
- You may use NSPIRES (<http://nspires.nasaprs.com>) or Grants.gov (<http://www.grants.gov/>) to submit your proposal. (But remember that regardless of the system used, *all proposers, team members, and agency officials must be registered with NSPIRES before proposal submission.*)
- See Section IV.B.3 of Appendix B for details.
- **Full proposals are due by 5:00 p.m. Eastern Time on March 17, 2016.**



PSI NRA Appendix B: Proposal Evaluation



- All proposals will be prescreened for compliance with requirements of this solicitation. Non-compliant proposals may be withdrawn from the review process and declined without further review.
- Compliant proposals will undergo a comprehensive review which includes evaluation of factors such as:
 - Intrinsic scientific/technical merit of the proposal (merit evaluation criteria described on the next slide)
 - Relevance to NASA's Human Exploration and Operations Mission Directorate (HEOMD)
 - Programmatic balance
 - Cost of the proposed work
- The most important factor in the evaluation is the intrinsic scientific/technical merit, but programmatic relevance/balance and available funds are all taken into consideration when making final selections.



PSI NRA Appendix B: Intrinsic Scientific/Technical Merit Evaluation Criteria



- 1) Effective use of the Physical Sciences Informatics system: How well do the investigators utilize the experimental data contained in the PSI system to meet the research goals stated in the proposal? How well does the use of this data advance research in the chosen research area?
- 2) **For Graduate Student proposals only: Academic benefit**: How well does the proposed research benefit the advancement of the student's education and achieving their advanced degree?
- 3) Significance: Does this study address an important problem? If the aims of the application are achieved, how well will scientific knowledge or technology be advanced?
- 4) Approach: Are the conceptual framework, proposed methods, and analysis techniques adequately developed, well integrated, and appropriate to the aims of the project? Is the proposed approach likely to yield the desired results within the specified timeframe? Does the project employ contemporary methods, concepts or approaches? Does the Data Management Plan meet NASA requirements?
- 5) Investigators: Are the investigators appropriately trained and well suited to carry out this work? Is the work proposed appropriate to the experience level of the investigators?
- 6) Environment: Does the scientific environment in which the work will be performed contribute to the probability of success? Is there evidence of institutional support?



Questions?

1. Chat questions
2. Phone questions

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<http://psi.nasa.gov>

- **Request Access**
- **System Demo**

Cheryl Payne, NASA MSFC



Questions?

1. Chat questions
2. Phone questions

Contacts:

Fran Chiaramonte – 202-358-0693 – francis.p.chiaramonte@nasa.gov

Cheryl Payne – 256-544-1667 – maptissupport@mail.nasa.gov

NSPIRES Help Desk – 202-479-9376 – nspires-help@nasaprs.com

Key Dates:

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PSI Demo Screenshots



PSI
Physical Sciences Informatics System

Home Investigations About Announcement Register Sign In

Click Register to request access to PSI

Announcement

NASA Research Announcement (NRA) - Synopsis of Solicitation: [NNH15ZTT001N-15PSI_B](#)

NASA plans to release the second appendix (Appendix B) of the NRA "Use of the NASA Physical Sciences Informatics System" on or about January 19, 2016. The NRA solicits ground-based research proposals from established researchers and graduate students to generate new scientific insights by utilizing experimental data residing in NASA's Physical Sciences Informatics (PSI) system, an online database of past and current physical science International Space Station (ISS) flight experiments. The announcement email will also contain information on a proposers' conference NASA plans to host via WebEx in January shortly after the release of the full Appendix to provide



PSI Demo Screenshots



First Name: *	Middle Initial:	Last Name: *
<input type="text"/>	<input type="text"/>	<input type="text"/>
Country: *	Citizenship: *	
<input type="text" value="Select Country"/>	<input type="text" value="Select Citizenship"/>	
Business Class: *	Business Sub Class:	
<input type="text" value="Select Business Class"/>	<input type="text" value="Select Business Sub Class"/>	
Institution/Company: *	Address 1: *	
<input type="text"/>	<input type="text"/>	
Address 2:	City: *	
<input type="text"/>	<input type="text"/>	
State:	Email: *	
<input type="text" value="Select State"/>	<input type="text"/>	

* Required fields must be filled.

Unauthorized use of the computer accounts and computer resources to which I am granted access is a violation of Section 799, Title 18, U.S. Code; constitutes theft, and is punishable by law. I understand that I am the only individual to access these accounts and will not knowingly permit access by others without written approval. I understand that my misuse of assigned accounts, and my accessing others' accounts without authorization is not allowed. I understand that this/these system(s) and resources are subject to monitoring and recording. I further understand that failure to abide by these provisions may constitute grounds for termination of access privileges, administrative action, and/or civil or criminal prosecution.

Acceptance of the above statement is required for accessing the PSI Database Site.

☒ I do NOT accept ☐ I accept

Send

Reset

Fill in form, accept
terms and
conditions and
click Send

New users will
receive an email
with login
information



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Physical Sciences Informatics System

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Click Investigations for a current list of Investigations and status

Announcement

NASA Research Announcement (NRA) - Synopsis of Solicitation: [NNH15ZTT001N-15PSI_B](#)

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PSI Demo Screenshots



Investigations

Acronym	Title	Research Area	Completion Status	NRA Eligibility
BASS	Burning and Suppression of Solids	Combustion Science	Completed 2016	No
DAFT	Dust and Aerosol Measurement Feasibility Test	Combustion Science	Complete	Yes
DAFT-2	Dust and Aerosol Measurement Feasibility Test-2	Combustion Science	Complete	Yes
FLEX-1	Flame Extinguishment Experiment	Combustion Science	Complete	Yes
FLEX-2	Flame Extinguishment Experiment-2	Combustion Science	Completed 2016	No
SAME	Smoke Aerosol Measurement Experiment	Combustion Science	Complete	Yes
SAME-R	Smoke Aerosol Measurement Experiment Reflight	Combustion Science	Complete	Yes



Page through
Investigations by
Research Area



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NASA Research Announcement (NRA) - Synopsis of Solicitation: [NNH15ZTT001N-15PSI_B](#)


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Returning users
click Sign In




PSI Demo Screenshots









PSI
PHYSICAL SCIENCE INFORMATICS SYSTEM

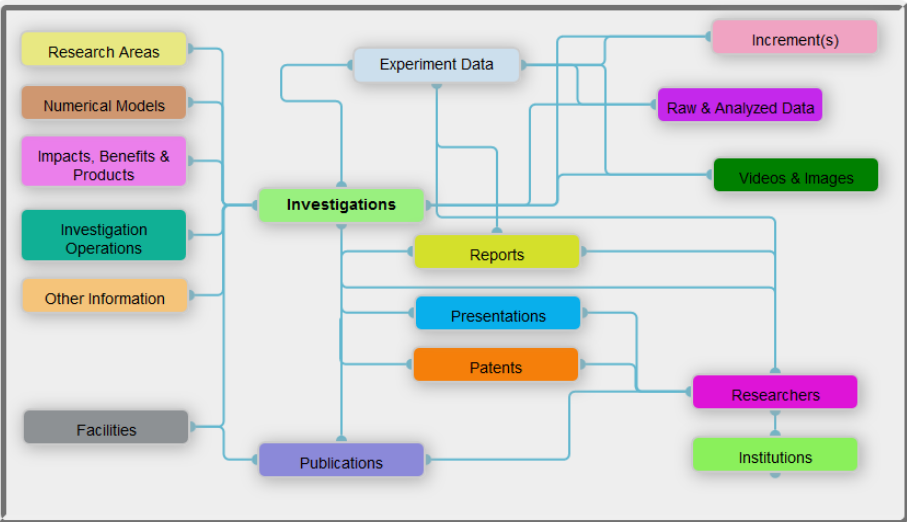
Menu 

Welcome to ISS Physical Science Informatics System (PSI)

InvestigationsPublicationsRaw & Analyzed DataResearch AreasResearchersVideos & Imagesmore...

New Record 

 home  help

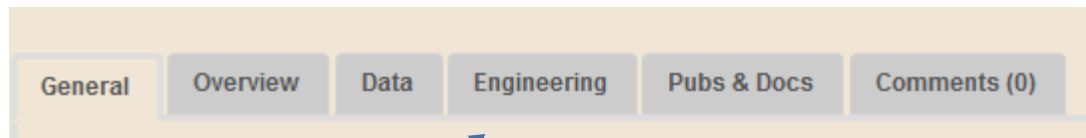


AnnouncementsOverviewResearch AreasInvestigation Status

NASA Research Announcement (NRA)
Synopsis of Solicitation: [NNH15ZTT001N-15PSI_B](#)



PSI Demo Screenshots



Tabs or data categories have different types of data on them. Click on the different tabs to navigate through the data within an investigation.



PSI Demo Screenshots



Smoke Aerosol Measurement Experiment (SAME)

[Edit Record](#) [Export Record](#) [Share](#)

Was this information helpful? [Like](#) 0 [Dislike](#) 0

Notify Me ☐

[General](#) [Overview](#) [Data](#) [Engineering](#) [Pubs & Docs](#) [Comments \(0\)](#)

Investigation Overview

Research Objectives: Smoke and Aerosol Measurement Experiment (SAME) measures smoke properties, or particle size distribution, of typical particles from spacecraft fire smokes to provide data to support requirements for smoke detection in space and identify ways to improve smoke detectors on future spacecraft.

Research Overview: Fire is commonly detected by measuring changes in the amount of airborne microscopic particles (one of the components of smoke).

Smoke detectors currently in use on ISS and Space Shuttle are based on detectors used on Earth that detect different sizes of smoke particles.

SAME will measure the distribution of particle sizes in smoke from on-orbit combustion of several materials found in the spacecraft. Testing will also examine the effects of sample temperature, air flow and smoke residence time (near the source) on the particle size distribution of the smoke.

Results will allow an evaluation of the performance in microgravity of the two existing U.S. spacecraft smoke detector designs, in use on the Shuttle and ISS, and evaluate other fire detection devices.

Information from this experiment will improve the design requirements for and reliability of smoke detectors on future spacecraft.

[Show Less-](#)

Space Applications: The SAME experiment will provide technology for an advanced fire detector for future spacecraft that will be used for long duration missions. SAME will provide quantitative data on the sensitivity of these detectors to reduced gravity smokes that will allow evaluation of the adequacy of these existing technologies using relevant data. The current Fire Prevention, Detection, and Suppression (FPDS) program plan allows for the re-evaluation of future sensor technology, to allow new technology and capability to be utilized. The results from SAME are needed to provide the reduced gravity baseline data against which future detection technology developments can be evaluated.

[Show Less-](#)

Earth Applications: The smoke detectors developed from the results of SAME can also be useful in other extreme environments on Earth, such as submarines or underwater laboratories. Accurate detection of smoke in these environments can save lives.

Other Information: [SAME Other Information](#)

INVESTIGATIONS

The Overview tab contains information about the general idea and objectives of the experiments within the investigation.



PSI Demo Screenshots



Capillary Channel Flow (CCF)

Edit Record Export Record Share

Was this information helpful? 0 0

Notify Me ☐

General Overview **Data** Engineering Pubs & Docs Comments (0)

Scientific Data and Information

Data Organization Document: CCF-PSI-DataOrganizationDocument.docx

Experiment Data: Displaying 21 records.

Science Requirements Document(s): CCF_SRD.pdf

PIMS/SAMS Acceleration Data: Principal Investigator Microgravity Services International Space Station Website

INVESTIGATIONS

Data organization documentation

The SRD provides more in depth information about the experiment concepts.

Download document(s)



PSI Demo Screenshots



Capillary Channel Flow (CCF)

Edit RecordExport RecordShare

Was this information helpful?

0

0

Notify Me

GeneralOverviewDataEngineeringPubs & DocsComments (0)

Scientific Data and Information

Data Organization Document: CCF-PSI-DataOrganizationDocument.docx

Experiment Data:

Displaying 21 records.

CCF - Frequency 1.0Hz, Slider Length 0 mm
CCF - Frequency 1.0Hz, Slider Length 15mm
CCF - Frequency 1.0Hz, Slider Length 20 mm
CCF - Frequency 1.0Hz, Slider Length 25 mm
CCF - Frequency 1.0Hz, Slider Length 28 mm
CCF - Frequency 1.0Hz, Slider Length 32 mm
CCF - Frequency 1.0Hz, Slider Length 38 mm
CCF - Frequency 1.25Hz, Slider Length 15 mm
CCF - Frequency 1.25Hz, Slider Length 20 mm
CCF - Frequency 1.25Hz, Slider Length 25 mm
CCF - Frequency 1.25Hz, Slider Length 28 mm
CCF - Frequency 1.25Hz, Slider Length 32 mm
CCF - Frequency 1.25Hz, Slider Length 38 mm
CCF - Frequency 2.0Hz, Slider Length 0 mm
CCF - Frequency 2.0Hz, Slider Length 15 mm

Science Requirements Document(s): CCF_SRD.pdf

PIMS/SAMS Acceleration Data: Principal Investigator Microgravity Services International Space Station Website

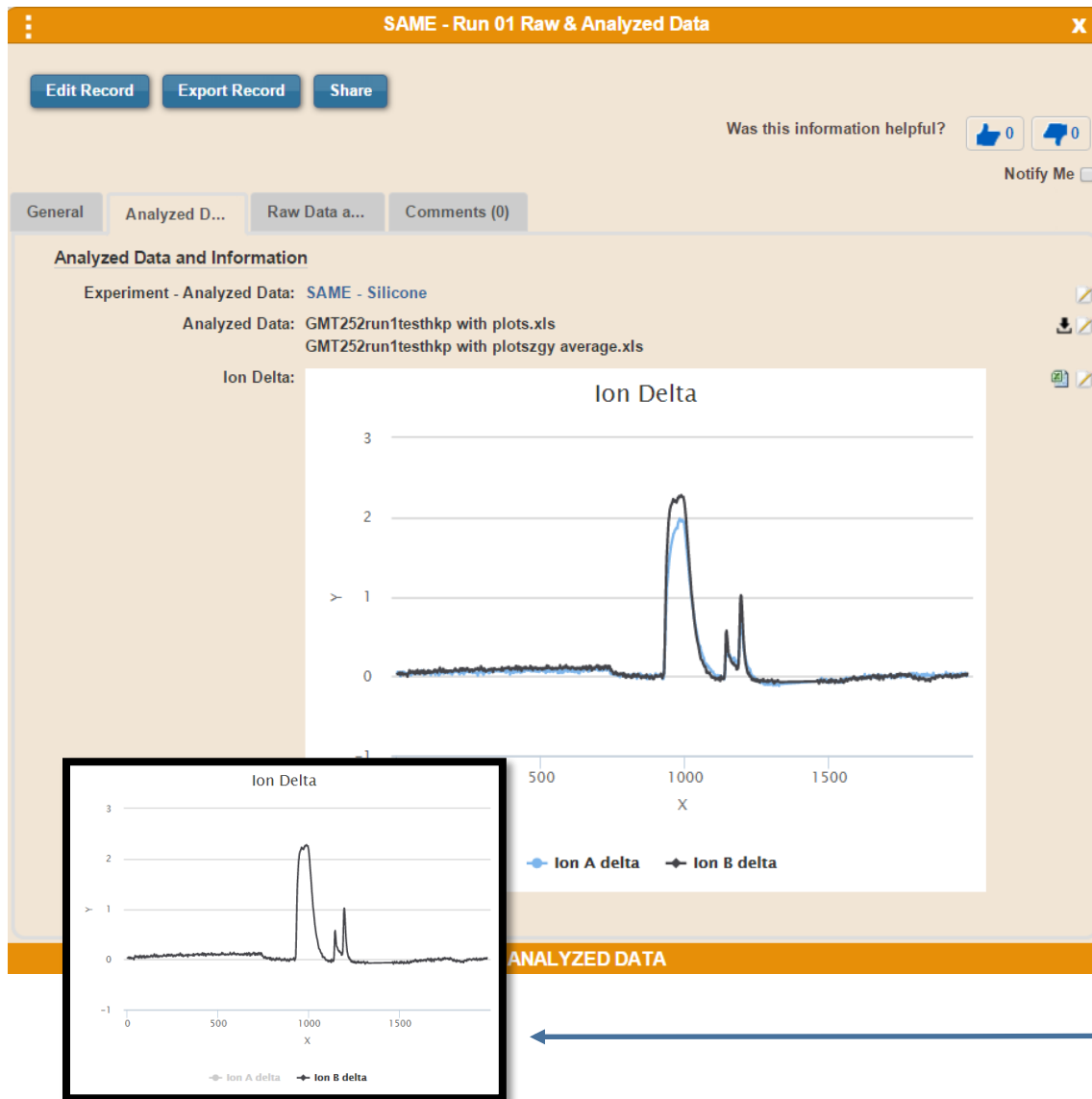
INVESTIGATIONS

Expand to explore experiment data

Page No. 30



PSI Demo Screenshots



Analyzed data displayed in a plot. Plot attributes can be turned on/off.



PSI Demo Screenshots



FLEX MeOH

Edit Record

Export Record

Share

Was this information helpful?

0

0

Notify Me ☐

Scientific...

General

Comments (0)

Scientific Data and Information

Raw Data: Displaying 142 records.

Analyzed Data: Displaying 262 records.

Raw Videos: Displaying 506 records.

Images: Displaying 788 records.

FLEX_025_09_Nov_2009_MeOH_191R001

Edit Record

Export Record

Share

Was this information helpful?

0

0

Notify Me ☐

General

Analyzed D...

Raw Data a...

Comments (0)

General

Investigation(s): FLEX

Link to associated Investigation(s): Flame Extinguishment Experiment (FLEX)

Record Accessible by: Public

RAW & ANALYZED DATA

Carbon Dioxide - C024M03A

Edit Record

Export Record

Share

Was this information helpful?

0

0

Notify Me ☐

General

Image Data...

Comments (0)

General

Investigation(s): FLEX

Link to associated Investigation(s): Flame Extinguishment Experiment (FLEX)

Record Accessible by: Public

Video Data and Information

Associated Experiment(s): FLEX MeOH

Videos: vlc-record-2013-01-24-20h16m47s-udp__C024M03.mp4

VIDEOS & IMAGES

- Data organized and grouped together by:
- Raw & Analyzed Data
 - Videos & Images



PSI Demo Screenshots



CCF Test Runs

	FREQ.	SLIDER LENGTH	USERS	POSSIBLE TYPO LOCATION	DUTY CYCLE	K3 RATE	PARACHUTE DIFF C9	PREDICTED DIFF C9	PREDICTED Q_G(ML/S)	PUMP SPEED	END DIFF C9 LOW	END DIFF C9 HIGH	PRESSURE 1SW	K3 POSITION	BUBBLE EXIT LENGTH										MERGE	INGESTION	L
															1	2	3	4	5	6	7	8	9	10			
1	1	0	TH, MW	Pump Speed	40	0.01	10.13	11.46	0.028	7	25.2	25.1	1115.1	45											s		
2	1	0	TH, MW	Pump Speed	60	0.01	6.29	7.61	0.027	7	16.8	16.7	1121.4	45											s		
3	1	0	TH, MW	Pump Speed	60	0.01	6.29	7.61	0.027	7	5.1	5.2	1090	59.3											s		
4	1	0	TH, MW	Pump Speed	60	0.02	12.67	15.33	0.055	7	4.6	4.5	1092.4	58.5											s		
5	1	0	TH, MW		50	0.01	7.82	9.15	0.028	3	8.4	8.6	1125.4	44.4											s		
6	1	0	TH, MW		50	0.02	15.79	18.44	0.055	3	16.7	16.8	1094.1	58.8											s		
7	1	0	TH, MW		50	0.02	15.79	18.44	0.055	1	18.6	18.7	1130.1	43.3											m		
8	1	0	TH, MW		50	0.01	7.82	9.15	0.028	1	9.4	9.6	1097.8	59.3											m		
9	1	0	TH, MW		50	0.01	7.82	9.15	0.028	1	9.9	10	1099.3	58.7											m		
10	1	0	TH, MW		50	0.01	7.82	9.15	0.028	2	7.9	7.8	1110.6	53.6											s		
11	1	0	TH, MW		50	0.01	7.82	9.15	0.028	2	8.1	8	1111.8	52.9											s		
12	1	0	TH, MW		50	0.01	7.82	9.15	0.028	3	8.5	8.4	1112.6	52.2											s		
13	1	0	TH, MW		50	0.01	7.82	9.15	0.028	3	8.1	8	1113.5	51.6											s		
									0.028	0.5	41.6	41.7	1104.08	59.2											mm		
									0.028	0.6	42.7	42.4	1106	58.8											mm		
									0.028	0.8	42	42.1	1147.5	58.1											mm		

CCF Test Runs

POSSIBLE TYPO LOCATION	DUTY CYCLE	K3 RATE	PARACHUTE DIFF C9	PREDICTED DIFF C9
Pump Speed	40	0.01	10.13	11.46

[Export grid data to Excel or expand grid view](#)

[Test data represented in a grid, Can include videos, spreadsheets, etc.](#)